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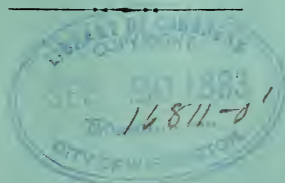
Home College Series.

Number ~~~~~ * ~~~~~ Thirty-Eight.

A SET OF TOOLS.

BY

REV. ALFRED TAYLOR.



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THE "HOME COLLEGE SERIES" will contain one hundred short papers on a wide range of subjects—biographical, historical, scientific, literary, domestic, political, and religious. Indeed, the religious tone will characterize all of them. They are written for every body—for all whose leisure is limited, but who desire to use the minutes for the enrichment of life.

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And what a young man may do in this respect, a young woman, and both old men and old women, may do.

NEW YORK, *Jan.*, 1883.

J. H. VINCENT.

A SET OF TOOLS, AND WHAT TO DO WITH THEM.

WHAT shall we do with our tools? Rather let us ask, What could we do without them? A box of tools is to-day the necessity of every American household. Whether in the city or on a farm, in a new settlement or on a desert hermitage, we must have some tools, or we are desolate. We must know how to use them, or we are helpless. Happily it has of late years become customary to give every boy an opportunity of learning something about tools and their management. The girl, too, has picked up many useful hints as to the profession of carpenter and machinist. The general introduction of the sewing-machine has had much to do with this. The girls, who formerly could hardly tell a screw-driver from a kitchen poker, are now able to take a sewing-machine apart and put it together again.

As in other inventions and appliances bearing on the world's work of to-day, so in tools; the inventions and improvements of very recent years have been out of all proportion to those of previous centuries. For long ages there was very little improvement in tools or in implements of agriculture. People were satisfied with using such things as their fathers and grandfathers had used before them. Even among the more civilized nations, where the art of working in steel was well understood, it is only in recent years that superior tools have been put in the hands of the people. There have always been a few skilled artificers who had fine tools with which to do fine work. With these they accomplished as choice results as can now be attained with similar tools and by hand work. A vast amount of delicate

inlaid work and cabinet work was done in this way in former centuries. As to the use of steel, there is nothing so very novel in it. The sword-makers of Damascus, centuries ago, made quite as good steel as is made in our day. But they did not apply it to any great extent to tools for ordinary use. One of the great differences between the tool-making of earlier days and that of to-day was that in those days fewer tools were required, because less work was done. When Hiram, King of Tyre, sent his workmen to the forests of the Lebanon mountains to procure timber to fill his contracts for Solomon, every tree that was cut down was felled with the ax by the slow process of hand chopping. There was no such thing as a saw-mill in which the great cedar logs could be dressed off and sawed into boards. Thus the processes of carpentry were slow and tedious. In those days it made but little difference, for there was plenty of time, and nobody was in a hurry. In the days of Noah's ark-building there must have been an abundance of leisure for the slowest kind of work. If the ark was 120 years in building, the antediluvian carpenters probably took their own time in their own way.

We have abundant evidence that the ancients were skilled in masonry and the use of stone-cutting tools. They made musical instruments of metal and of wood, necessitating the use of many fine tools and of a thorough knowledge of metal-working and of the finer kinds of carpentry. They spun and wove textile fabrics of great variety and of beauty, although their spinning machinery and their looms appear to have been of very simple construction. The tools required in brick-making and pottery were the most primitive we can conceive of. For farming there were plows and threshing instruments, and sickles and pruning-hooks, and spades and shovels. For carpentry there were hammers and axes and saws, with, probably, a variety of the lesser kind of tools, including borers of various simple patterns.

The better to realize what the tool-makers of to-day have given us, let us look back half a century. Fifty years ago there was not a sewing-machine. There were but a few locomotive engines. There were stationary engines for pumping and for other purposes, but, as compared with the engines of to-day, they were mostly unsatisfactory things, not always working either smoothly or reliably. There were turning-lathes, on some of which as fine work was done as can be done to-day. They were worked laboriously by foot power. Printing-presses were generally small affairs, worked by hand, even for the daily newspapers. There were no such foundries as now turn out the ponderous machinery for our great ocean steamers, nor were there any machines capable of doing the turning and planing involved in the construction of a marine steam-engine. The water-works of our great cities were hardly in their infancy, many of them then being unborn. Had there been a general introduction of steam-engines for such things as machine-shops and printing-presses there would not have been a good supply of water. Even in the city of New York water was, fifty years ago, carried from door to door in carts, and sold at a cent a bucketful. There were pumps at various places in the city, from which these carts were filled. Most of the mechanical work which is now done by machinery was then done by hand in a slow way, and with a great deal more laborious toil.

In the carpenter's tools of half a century ago, such as the mechanic used at his bench or the householder had in his family tool-chest, there was a comparatively limited variety. Most of the tools were deficient in shape, quality, or efficiency, as compared with those we have now. Even in such a simple thing as a hammer there have been many improvements. There are now hammers for every conceivable variety of hammering, from the delicate-handled and light-headed little hammer used by the jeweler in his finest work to the great

solid steel spiking-maul with which the railroad constructors drive into the cross-ties the spikes which secure the rails. The silversmith has his "round pein" or "cross pein" hammer, with which to do his dainty *repoussé* work; and the stone-cutter deals heavy blows on granite with his "spalling" of steel with hardened single or double face. The lady tacks down her carpet with the slender tack-hammer, and woe to her thumb-nails if she has thought to economize by buying a "cheap" cast-iron thing for four cents, instead of a steel-faced one at a little higher price.

The boring tools of half a century ago were mostly clumsy things. How perversely they used to split and tear the wood in which we vainly attempted to make neat holes! They seemed made on purpose to cause boys vexation and disappointment. How the grown-up carpenters managed to use those old gimlets without spoiling all their work was a thing "we boys" could never understand. Most of the borers were worked by hand. There was the old-fashioned brace-and-bit device for boring. The brace had no catch in it to keep the bit from tumbling out; consequently the bit gave trouble by falling out of the brace as soon as a hole was bored. When some ingenious inventor thought of a simple catch to fit into a notch in the bit, and thus hold it fast in the brace, it was considered a great triumph of genius. The gimlet-pointed screw, so common now, had not then been invented. The screws had flat ends, like nails. In order to get a screw into a piece of wood we had first to bore a hole with an awl, or with one of those awful old gimlets with which we ran a risk of splitting and cracking the wood. Now we have only to start a hole for the gimlet-screw, stick the screw in, hit it a rap or two on the head, then drive it home with the screw-driver, and the work is done. We had hand drills for boring fine holes fifty years ago, but what sort of things were they? They ran on the "fiddle-bow" principle, and generally failed us when we wanted to drill a

hole. If our drills were all broken, as they generally were, and we went to a hardware store for new ones, the hardware man told us that he had none, and never kept any. He furthermore would tell us that the best way to get drills was to make them for ourselves out of steel wire. It is not to be denied that this was an improving and instructive exercise, but it sadly exercised our patience. Now we can, at any respectable hardware store, buy steel drills of any size, in any quantity, without a moment's previous notice, and at a price so small as to make us wonder what profit there can be in fashioning and selling such things. As to the handles in which to set the drills, and by means of which to make them go round, there are dozens of different kinds, each claiming to be better than all the others.

The planes of older days, what clumsy things they were, compared with the beautiful things of iron and bronze frames with which we now do our smoothing! There were "jack-planes" for rougher work, and "fore-planes" for finishing. Then there were bead-planes and rabbet-planes and tongue-and-groove-planes, just as now, except that these were all clumsy blocks of wood with the plane-bit fastened in by a wedge. In order to set the bit, or cutter, so as to take off a chip of the desired thickness, the bit had to be held in place with one hand while with the other hand the wedge was hammered into position. This being done, it was generally found that the bite of the bit was too heavy or too light, or, in other words, that we had pounded the bit too far through, or else not far enough. Then we had to knock it out by pounding on the back end of the plane, and do the work of setting all over again. After working a little while the plane would become choked with chips, and we had to knock the bit out, empty the chips, and again put every thing together in place. It seems almost miraculous that we ever accomplished any thing with such planes. Look at our planes now. They are of metallic frame, with

the position of the bit regulated by a set-screw. Instead of hammering and pounding and banging the plane to pieces, a turn of screw with thumb and finger accomplishes the desired result, and puts the bit just where we want it, so that it will bite through exactly the right thickness of shaving to be taken off. Thus we save time and effort, avoid bruising our fingers, and succeed better in possessing our souls in patience.

In sawing wood the present days are the better days. The principle of the hand-saw of to-day is the same as of the saws used by Noah and Solomon, namely, a notched blade of steel, pushed or pulled through the timber in such a way as to make a cut. But there is a great improvement on the old way of working by hand, either for straight work or for that which is curved. Now we do much of our sawing by a delightful little machine worked by a treadle. An easy motion of the foot keeps the machine going. A blade which works up and down with great rapidity does the cutting at the down stroke. Although this is a very narrow blade, with extremely small teeth, it cuts through boards of considerable thickness, provided the machine is powerful enough to drive it. The power with which the machine carries the saw blade does not always depend on the vigor with which the operator works the treadle. In the machines, of which a large balance-wheel is one of the important parts, the weight of the wheel has much to do with the regularity of the motion of the saw blade as well as with the power it exerts. There are machines made on a different plan with a wheel which moves continuously and positively, without a crank, and by treading down the treadle. Such a machine will carry a saw-blade through three-inch pine and leave a perfectly smooth cut which needs no after finishing.

The introduction of the foot-power saw has done great things for the young people of the present generation. To use it is delightful work, and has in many instances been

found pecuniarily profitable. Almost any young person of intelligence can manage one, and do a wonderful amount of useful and ornamental work. The physical effort required is so small that even invalids who can do hardly any thing else can run a saw of this kind. There are many instances in which families have been supported by the pleasant labor of some one who could do nothing else but operate such a saw. The cultivation of good taste resulting from this work is an important consideration. Patterns for sawed work may be bought at the stores in endless variety and for a trifling price. After using these for awhile a young person of reasonable ingenuity is able to devise patterns for himself, and strike out in many original lines. The putting together of sawed work in the way of brackets, book-shelves, cabinets, and other objects of use or ornament, is often the means of acquiring a knowledge of the arts of carpentering and cabinet-making. Practice in these respects serves as a wholesome stimulus to make boys and girls ingenious and helpful.

Closely related to the saw, in its practical usefulness and its domestic economy, is that useful and pleasure-giving contrivance, the turning-lathe. The turning-lathe is an old device ; exactly how old, nobody knows. But the turning-lathe as we now find it, compact, handy, economical, and ready for every-day use in any body's house, is a thing of the past few years. Half a century ago there were lathes, large and small. One of the earliest uses of the steam-engine in ordinary mechanical operations was to move the big turning-lathes which turned posts for the old-fashioned high-post bedsteads. Then there were smaller lathes for finer work. Once in a long while some wealthy amateur would be heard of who had a turning-lathe in his house. I knew of two such men when I was a boy. They and their lathes were my delight and my envy. The lathe of to-day differs from the earlier lathes in its convenience, its com-

pactness, and its cheapness. Inventors and machinists have made many patterns of lathes, as they have of saws. Each has some particular feature to recommend it above all others. Some are lathes alone, while others have attachments for fret-sawing and for circular-sawing. Here let it be noted that the sawing which is done by means of a revolving circular saw is always in a straight line. A fret-saw blade can also be made to do its work in a straight line, but for straight work the "circular" is the more efficient. One of the most complete lathes that can be desired is the sort which has both these sawing attachments. When the lathe is to be used for turning, the saw attachments are folded on hinges, and are out of the way. The head-stock is the part of the lathe on which are the wheels or pulleys which receive their motion by a band or belt from the big driving or balance wheel below. The balance-wheel is worked by a treadle and crank, as a general thing. The tail-stock is at the other end, the bed of the lathe (which should always be of iron) connecting the two. The tail-stock may be moved along on the iron bed to bring it to the required distance from the head-stock, according to the length of the piece of work to be turned. It is kept in place by a set-screw. An important adjunct of the lathe is the hand-rest on which the tool is placed. In the cheaper lathes this rest must be moved by hand to the place wanted, where it is fastened by a set-screw. In the more expensive lathes a sliding-rest is furnished, which is moved by a screw. This rest carries the tool, which by its aid is held firmly against the work. In case of a sliding-rest which works automatically, the tool is made fast to the rest, and does its work as it moves. When a large quantity of work of a particular kind is to be done on a lathe, such, for instance, as a lot of tool-handles which are all to be of exactly the same size, a chisel or chisels may be made to suit the exact size and shape. These chisels are placed in adjustable rests and moved so as to be

brought in contact with the pieces of wood which are to be shaped.

The turning of metal work is much the same as that of wood work, except that the material to be operated on is harder, and that it takes more labor and more experience. Almost any careful youngster can soon learn to operate a lathe on ordinary wood work. He may cut his fingers a few times, and he need not be surprised if his work sometimes perversely picks up his chisel by the wrong end and sends it flying up to the ceiling, or hits him in the head with it. This sort of disaster often happens to experienced workmen. A dentist was polishing in his lathe a set of teeth which he had just finished for a clergyman who was to lecture that night, and who needed to put the artificials in his mouth. Suddenly the revolving polishing-brush caught the new teeth, jerked them up to the ceiling, whence they were dashed on the floor in a state of ruin. The luckless clergyman had to lecture that night with a broken old set of teeth which imperfectly fit him. He was annoyed, and some of his best friends were disgusted with the lecture.

WHO SHOULD HAVE TOOLS ?

Every boy ought to be provided with tools, just as with books. There are some boys who will excel with them, and others who will not, just as with every other branch of education. The cost of enough tools to make the trial with is so small that the experiment is worth trying on every boy. There are but few boys so dull that they will make an utter failure. A tool-box should be among the first presents bestowed on a growing boy. As for the girls, there is nothing unladylike in the use of tools or in a thorough acquaintance with them. One thing should be carefully avoided, whether for boy or girl, namely, the good-for-nothing tools of soft iron with which many "cheap" tool-boxes are filled. These are supposed to be cheap because very little money is asked

for them. There is no more economy in buying such tools than in getting an old, worn-out, and rattle-bang piano for a beginner to practice on. Let every boy or girl begin with something that is worth using, and that will do fairly good work. As success is attained with the first tools, more can be added, and the work of mechanical education will go on almost of itself. The youngster who begins at an early age with a hammer, saw, gimlet, chisel, and a lot of nails, may make a dirt in the house or the back yard, and then provoke criticism. But the art of being neat is almost as important as that of carpentry, and he must learn at the outset to pick up every chip he makes, and to sweep away every atom of sawdust. "A PLACE FOR EVERY THING, AND EVERY THING IN ITS PLACE," is one of the first rules to be learned in connection with the use of tools. A boy who has a wholesome ambition to observe this rule will make friends in the practice of his amateur carpentering and contriving.

As to the money consideration, there are many boys who are ready to excuse themselves for having no tools by saying that their parents gave them none, and that they have no money of their own with which to buy any. There is nothing but the most dreadful poverty that should serve for such an excuse. Tools cost but little, and are worth all they cost. It is not necessary to buy a whole outfit at once. The expenditure of a little money every week or month will soon enrich a boy with tools. Many boys can procure a good outfit of tools by saving the money which they would otherwise spend on foolishness. If the cigarette-smoking boy will carefully count up how much he spends in a year for dirty tobacco, he will find it more than enough to keep him supplied with good tools, a foot-power fret-saw, and working material enough to keep him happy. The amount which some boys spend in a year for cigars, chewing-tobacco, and bad books, would furnish them with a first-class turning-lathe and all the necessary appliances.

The educational power of the tools is not to be despised. Many a boy has learned to be an artificer, an engineer, or an inventor, by having tools of his own to work with. The very spoiling of a boy's first job has often led him to determine to do the next job without spoiling it. From partial success an ambitious boy goes on to more complete success. The clumsy fellow at whose first awkward work all his friends and relations smile is often the one who goes on to achieve renown as a perfect workman. Let no boy be discouraged by first failures. Few people have ever made a crowning success with their first undertakings. "*Finis coronat opus.*" If you don't understand that, ask some friend with a Latin dictionary.

But there is something in tools far above mere education. Tools have morals, if rightly used. There is an incalculable advantage to the young man who, by such home attractions as his tool-box can give him, is kept from spending his evenings in bad company. Every young man has surplus energy as well as spare time over and above what are occupied with book learning. It is not well to be studying books during all of our waking hours. We must have a little variety in our employment. So with the young folks who have left school, and being engaged in some work which brings wages, have their evenings to themselves. Thousands of boys have come to a bad end because, having nothing to do in the evenings, they strolled forth to meet other fellows who had nothing to do. Had they confined themselves to doing nothing, it might not have been so bad for them. But energetic young persons are not content to do nothing. If they have absolutely nothing to do, they will soon be doing mischief. Many a successful young man can to-day trace a large measure of his success to the fact, that when he was a boy he was provided with tools, and thus kept busy. Mind and body were employed. The genius of invention was stimulated. The organ of constructiveness was developed.

The youth learned to admire the busy mechanic and the industrious artisan, even if found with greasy hands or dusty clothing. He learned to entertain a supreme pity, perhaps with a shade of contempt in it, for the rich young upstart who, having inherited wealth, had no higher ambition than to squander it in indolence and dissipation, without making the world any better for it. The young man who makes the most of his ingenuity, and schools himself in all that is useful in art, industry, and science, is sure to push on to success. The busy brain which contrives, and the skillful hands which execute, may, under God's blessing, accomplish majestic results, not only for the ingenious and thrifty man's household, but for humanity at large.

"A heart to resolve, a head to contrive, and a hand to execute."—GIBBON.

"I know a hawk from a handsaw."—SHAKESPEARE.

"The hand that rounded Peter's dome,
And groined the aisles of Christian Rome,
Wrought in a sad sincerity;
Himself from God he could not free;
He builded better than he knew;
The conscious stone to beauty grew."—EMERSON.

"And he fashioned it with a graving tool."—EXODUS xxxii, 4.

"But now my task is smoothly done."—MILTON.

"Such and so varied are the tastes of men."—AKENSIDE.

"And hear thy everlasting yawn confess
The pains and penalties of idleness."—POPE.

"A servant with this clause
Makes drudgery divine;
Who sweeps a room as for thy laws,
Makes that and th' action fine."—HERBERT.

"By sports like these are all their cares beguiled."—GOLDSMITH.

"But as one was felling a beam, the axe head fell into the water: and he cried, and said, Alas, master! for it was borrowed."—BIBLE.

"Neither a borrower nor a lender be,
For loan oft loses both itself and friend,
And borrowing dulls the edge of husbandry."—SHAKESPEARE.

"The proper Epic of this world is not now 'Arms and the man'; how much less 'Shirt-frills and the man': no, it is now 'Tools and the man': that, henceforth to all time, is now our Epic."—CARLYLE.

A SET OF TOOLS.

[THOUGHT-OUTLINE TO HELP THE MEMORY.]

1. Tools for every body? Better tools than formerly? Hiram? Noah? Solomon?
2. Smaller tools? Plane—Drills—Hammers? The lathe—for wood—for metal?
3. Cheap tools not best? Easily gotten? Practice? Neatness? How to save money to get a supply? The good of it? To body and mind, and morals, too.

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